DISTILLATION, IRELAND.

Copy of the **REPORT** made to the Commissioners of Excise in *Ireland*, by Officers appointed to superintend the EXPERIMENTS in the Process of Distillation, carried on at *Carrickfergus*, and transmitted by the said Commissioners to the Chancellor of the Exchequer.

Whitehall, Treasury Chambers,
16th May 1821.

S. R. LUSHINGTON.

Gentlemen,

Carrickfergus, April 16th, 1821.

WE reported, on the 6th January last, the result of Experiments carried on at the distillery of Mr. John Thompson, of Carrickfergus, with machinery invented by Thomas Pottinger, esquire; and with reference to that part of our report, wherein we state, that the defective apparatus, contrived by Mr. Pottinger, was to be replaced by another of a different and simpler description, suggested by Mr. Coffey, one of our number; we now beg leave to report, that we resumed our Experiments on the 5th of March, with this new apparatus, which we applied to a still of 500 gallons content.

This apparatus is contrived for the purpose of recording every part of the distiller's operations, from the time he brings his wash into the still-house, until he takes the finished spirits out of his receiver, without the agency of the officers who may be in charge of the distillery, and solely by the action of the machinery, not within the control of either officer or distiller.

The principles on which this apparatus acts, may, in general terms, be described to be as follows:—First, the still is so constructed, that no wash can be put into it without passing through a close vessel, wherein the quantity is measured and recorded; second, the low wines and feints receivers have no outlets, except to the still, and through a similar measuring vessel; and lastly, that nothing can be taken out of the receiver, containing the finished spirits, without passing through a measuring vessel, which records how often it has been filled and emptied, and also retains a sample of spirits, by which the strength of what had been taken out can at all times be known.

The vessel employed for measuring the wash in the Carrickfergus distillery, served also as a still charger, and may be called the "Wash Measuring Charger." It is a close vessel, commanding the still, with two stop-cocks, or a double cock, affixed to it, so constructed, that, by the act of opening the cock for filling the charger, the other for emptying it is shut, and *vice versâ*, so that the vessel cannot be at the same time receiving and discharging the wash. A click and ratchet wheel prevents the cocks from being turned, except in the one way, and every time the distiller turns it round, he can once fill his charger, and empty the contents into the still.

The cock is enclosed in a cast iron box, screwed to the charger by bolts secured on the inside, in such a manner as to be inaccessible to the distiller or officer, and within this box are a few wheels, of simple construction, which record the number of times the cock has been turned, and, of course, the quantity of wash put into the still; the number of revolutions of the cock is marked on an index within the box, visible through small apertures covered by glass.

An overfall pipe is fixed in this measuring charger, which shows the distiller when it is *full*. This pipe also serves to let air into the charger, but contains a valve to prevent any liquid being forced up through it.

Another charger commands the still, through which all the singlings and feints are conveyed from their respective receivers, and measured before they can be put into the still. This vessel is constructed exactly in the same manner as the wash charger, except that the overfall pipe requires no valve, because it terminates within the feints receiver, a close vessel, to which the distiller has no access.

The wash, singlings and feints, are conveyed from these chargers to the still through copper pipes, terminating in a small close copper case on the breast of the still, in which a third pipe also terminates, conveying water from the *bottom* of the worm-tub, when it may be thought necessary. In this case is a valve, opening and shutting at the distiller's pleasure, for the admission into the still of the liquids flowing through the three pipes, viz. the wash pipe, low wines pipe, and water pipe.

The head of the still (which is a tube turning down at an angle of about 45 degrees before it communicates with the worm) is attached to the still by screws, secured on the inside, as is also the case containing the valve just mentioned. The discharge cock is so constructed, as freely to let every thing pass out of the still, but nothing into it. It is permanently united with a discharge pipe leading into the spirit wash cistern, and saver.

The safety or air valve, instead of being fixed, as is usual, on the breast of the still, is on the arm connecting the worm with the head, of course no fluid can be conveyed through it into the still. There are no other openings in the still, except a man hole for the occasional examination of its interior.

At the discharge or tail of the worm, a three-way cock is fixed in such a manner that it cannot be removed. Through this, the spirits, singlings and feints are conveyed to their respective receivers at the distiller's pleasure, and every facility is afforded him for viewing the colour, heat, and strength of the liquor as it runs, by means of Mr. Pottinger's hydrometer, which is fixed to the worm close to this cock, and which operates in the manner described in our report of the 6th January.

The spirits, singlings and feints receivers, are close vessels; the two latter communicate with the still alone, by means of a forcing pump through the measuring charger, already described, and the ball cocks mentioned in our former report, are still made use of; but we see no necessity for the cast iron covers, which would impose on the distiller an unnecessary expense.

The spirits receiver is connected with the spirit measurer by a forcing pump, permanently secured (as is also the measurer itself) to the top of the receiver by bolts and screws fastened on the inside. No spirits can be taken out, except through this measure, which is filled and emptied by a cock or cocks, similar to those already described as attached to the wash charger. The number of gallons of finished spirits taken out of the receiver is thus accurately recorded.

In this spirit measure is placed a small close vessel of tinned copper, which is so connected with the cocks for filling and emptying the measure, that a small sample (about $\frac{1}{10}$ of a gallon) of each measure of spirits is drawn off, and retained in this vessel. A pipe, terminated by a cock, passes from this copper sample vessel through the bottom of the measurer into a locked up metal box. By this contrivance, the superior officers of excise may, at the end of every month, three months, or any other period that may be considered proper, ascertain the average strength at which the distiller has drawn off his spirits, and surcharge him accordingly for any excess.

Here the new system of measuring ends; the spirits, after being taken out of the receiver, are at the distiller's disposal, subject, however, as is every part of the distillery process, to the same mode of survey and account at present in use in the excise.

The still, the three receivers and the measuring vessels, are provided with man holes, for the double purpose of securing the different fastenings on the inside, and of affording

affording the superior officers of excise an opportunity of occasionally examining the interior of these vessels, by which any surreptitious pipe or perforation would be at once detected; and we would also recommend, for the purpose of facilitating such examination, that these receivers should be over ground, and fully exposed to external inspection. These man holes may be effectually secured by locks and seals, and the keys and stamps not intrusted, as in the ordinary mode of survey, to the officers in charge of the distillery, but deposited with the chief officer of the district, or if necessary, with the board in Dublin. The only one of these man holes which it may be necessary to open for distiller's convenience, is that of the still; and if that utensil be provided with scrapers for cleansing the inside, this necessity will be of very rare occurrence. To prevent the possibility of any abuse, it may, however, be required, that the distiller should give formal notice to the chief officer of the district whenever he wishes to have this man hole opened, and the lock of it, as indeed each of the other locks, may be so constructed as to record the number of times it has been opened.

We have in the foregoing details described the apparatus used by us during the course of six weeks experiment, with a 500 gallon still at Carrickfergus; but the whole will be better understood, by referring to the drawings of the several parts of the apparatus, which are now preparing.

It may be proper to observe here, that these drawings refer to the apparatus actually used by us at Carrickfergus, but that other devices, founded on the same principles, equally effective, and perhaps simpler in their construction, may be substituted for some parts of this apparatus. Thus, for instance, instead of the three-way cock at the tail of the worm, a small copper box with three valves, may be used for directing the stream into the spirits, singlings and feints receivers respectively, and instead of the hydrometer described in our report of the 6th January, the distiller may affix to the worm a glass jar, containing a thermometer and a few glass beads of different weights and colours, which would be quite sufficient to regulate his work. All the revenue can require on this point, is, that the run from the worm shall be placed out of the distiller's reach, and provided that object be attained, he should not be precluded from adopting any contrivance he may think proper for seeing the liquor as it runs. We consider it the more necessary to make this observation, because a serious accident did in fact happen to the still during our experiment, in consequence of Mr. Pottinger's hydrometer having got out of order, and this occurrence may possibly be stated by some distillers as an objection to the proposed system. This accident was however caused by imperfect workmanship, and at all events the glass beads are not liable to any such fatality. Upon the whole, we consider the checks in every respect complete, and have no hesitation in stating, that the entire revenue can be secured by them under a slow process of distillation, and where licensed, or entered utensils only are made use of.

It may probably be said, that on the supposition of the latter part of this measuring system being perfect, all the previous measurements and checks were unnecessary; and we do admit, that it is our opinion, unless unentered utensils be made use of, the revenue may be effectually secured by the measurement of the spirits alone. But until the efficacy of the new system shall be proved by experience, to the satisfaction of the most timid, we are unwilling to dispense with the additional checks in the previous stages of the process; and we think besides, that a strict eye should at all times be kept over the stock of wash in a licensed distillery, as otherwise, wash might be prepared therein to be afterwards distilled elsewhere, with unlicensed apparatus. We therefore propose to retain so much of our present system of account, as makes the distiller liable to duty on his wash, at the rate of ten gallons per centum.

With respect to the measuring charger for singlings and feints, we lay but little stress on the check afforded by it, where the distiller uses the same still for wash and low wines, because from the nature of the process, a portion of the produce of each charge of low wines will pass more than once through the still, and will therefore be more than once measured and recorded; but should it ever be deemed adviseable to compel the distiller to keep a still exclusively for working his singlings and feints, the low wine measuring charger, with a sample vessel within it, would then become as effective as the spirit measurer itself.

In stating our opinion so decidedly in favour of the apparatus we have been describing, we do not mean to say, that even this apparatus can secure the revenue, if adventurers, without capital or respectability, are allowed licenses to carry on the trade of making whiskey; as such persons, although sure of being detected, would resort to the most desperate expedients to evade the duties. Some line should therefore be drawn, and the following is our view of the subject:—

According to the present law, the smallest still that can be worked is one of forty-four gallons content, which will require a head of at least four gallons, making in all forty-eight gallons. This still, if worked with restricted utensils, is liable to a charge of one thousand five hundred and twelve gallons of spirits; and if worked with unrestricted utensils, to three thousand three hundred and sixty gallons per month. Now we conceive, that the Government will yield as much as can be reasonably expected to the wishes of those persons who are advocates for small stills, by consenting to grant licenses to distillers who will undertake, and give moderate security to make with unlimited apparatus, about one-third of the latter quantity, say twelve hundred gallons per month, while his distillery continued at work, and that it should be worked at least six months in the year. No smaller quantity of spirits than he could make in that time would afford a moderate profit to any respectable individual; and we are of opinion, that persons should not be allowed to trifle with the revenue by obtaining licenses to distil, unless they intended to follow the trade as a *bonâ fide* profession, from which they made their livelihood. We have ascertained, that exclusive of the building, the cost of which must vary from local circumstances, the whole expense of fitting up a distillery with the entire utensils and apparatus capable of making the quantity of spirits we propose, would not cost five hundred pounds, being about the one-half of what the *chimney alone* of a five hundred gallon still working under the present rapid system would cost.

The long agitated question about licensing small stills, might thus be readily disposed; for we see no reason whatever for prohibiting a distiller from using a still of any size he may think proper, under the system now in our contemplation, and we conceive that it might be left to his own option, to make the quantity of spirits which he had engaged for in a forty or a four hundred gallon still.

The advantages which would result, both to the revenue and the manufacturer, from the adoption of this system of working, are numerous. The rapid distillation at present required by law in Ireland has nothing to recommend it, but its being supposed to secure the revenue better than any mode of survey heretofore devised; and its disadvantages are such as to make it very questionable, whether it ought not to be abandoned, even at the risk of some loss of revenue. It causes, in the first place, an enormous waste of fuel; and, incredible as the fact may appear, our experiments have fully shown us, that one *eighth part* of the fuel consumed in working a still in Ireland under the present rapid system, would be sufficient to distil the same quantity of spirits by a slow process.

In the next place, this rapid distillation causes a very serious waste of the spirit which might be extracted from the wash, if distilled at leisure; a distiller working a still of seven hundred and fifty gallons content, is liable to a duty of nearly twenty pounds *per hour*. He cannot afford the necessary time to distil all valuable matter off his wash; and when the run from his worm becomes weak, he finds that the whole value of what is running is not nearly equal to the sum he must pay during the time his still would be employed in extracting and re-distilling it into spirits; he is therefore in his own defence, compelled to throw away this part of what his wash might produce; and the loss thus sustained may be moderately estimated at eight per centum on all the wash manufactured in Ireland.

A third source of waste is that branch of our rapid system which compels the distiller to work off his wash within six days of the date of brewing, thus allowing him but four clear days for fermenting it, no matter what may be the circumstances of weather, yeast, &c. The extent of the loss thus sustained cannot be calculated with much accuracy; but some idea may be formed of it, from the fact, that it is no uncommon circumstance for the Irish distiller to put his wash into the still at the gravity of from 10 lbs. to 17 lbs. per Dicas's saccharometer, thereby losing two or three gallons of the spirits which ought to be produced from each hundred gallons of wash.

Soap

Soap forms a large item of the Irish distiller's expenditure, as he cannot work off his still with the necessary rapidity without it. About a ton weight of this disgusting article is put into a still of 300 gallons content every month, and greatly injures the flavour of the spirits.

The expense of labour in a distillery worked in the rapid way, is beyond comparison greater than under a slow process. Two men would be sufficient to attend a still constantly working under the latter, while ten, or at least eight, are indispensibly necessary under the former.

The expense of erecting a distillery, under the system we are now recommending, would be less (including all the apparatus we have described for securing the duty,) than that of erecting one, of equal extent, to be worked under the rapid system. Some expense will, however, be incurred in adapting the works of the distilleries now existing to the new apparatus; but this expense would, in all cases, be covered in a very short period, by the saving of fuel.

The advantages which the revenue would derive from this change of system, appeared to us not less striking than those resulting to the manufacture itself. It is generally admitted, and we are of opinion, that at least one-fifth part of the spirits made in the licensed distilleries in Ireland, evades the duty. Assuming this to be the fact, the duty actually paid to the exchequer, by the licensed distillers, is but four shillings and nine-pence, instead of five shillings and eleven-pence halfpenny, per gallon of spirits, made by them; and if a system of collection were adopted, by which the excise obtained an account of all the spirits made by these distillers, a duty of four shillings and nine-pence per gallon would produce, at least, as great a revenue as is now produced by a duty of five shillings and eleven-pence halfpenny, while the distiller would derive a great advantage from such a reduction of duty. He would also, under the proposed system, be able to manufacture his spirits at a shilling per gallon cheaper than he does at present, and from the superiority of their quality, would receive a better price. These advantages, without at all diminishing the revenue, would most materially aid the legal trader in contending with illicit distillation, the increasing prevalence of which has become truly alarming, since the repeal of the townland fining law.

During our experiments, we made three brewings of strong wash, which, on distilling, we found to yield a coarse ill-flavoured spirit, whilst all that was made from weak or diluted wash was of very superior quality; ample details of the different stages of brewing, fermentation, produce, &c. have been recorded by Mr. Coffey (who attended to this part of the process during the entire experiments,) which will be laid before the board in a future report, accompanied by such further information as shall be derived from Mr. Thompson's recent offer to work his distillery for two months, subject to the checks and control of the apparatus before described, and placing his concerns, and every part of his process, under the immediate care of officers constantly stationed in his works, and submitting his books of every description to their inspection. We have, however, already ascertained to our own entire satisfaction, that it would require wash of 59 lbs. gravity, by Dicas's saccharometer, when attenuated to about 3 lbs. (which we consider better than the average of a distiller's fermentation for a season in Ireland,) to produce 10 per centum of spirits 24 per cent over proof, or that every 100 gallons of wash will produce one gallon of spirits of that strength, for every $5\frac{6}{10}$ lb. per Dicas's, of fermentable matter appearing to be attenuated.

This proportion we found to hold good, with very little variation, in wash of every gravity which we tried, and our experiments on this point have been made with such care, and were checked in such a variety of ways, that their accuracy may he implicitly relied on, and we find them also corroborated by the provisions of the law passed last year, for regulating the gravity of worts in the Scotch distilleries. We, therefore, cannot avoid expressing our surprize, at the very erroneous calculations on this subject, which are contained in the bills for the regulation of the Irish distilleries, introduced into the House of Commons last year. In these bills it is proposed to charge the Irish distiller (working under all the wasteful disadvantages of rapid distillation and fermentation) with twelve per centum of spirits twenty-four per cent over proof, from wash of the original gravity of sixty-six pounds, by Allen's saccharometer, while the bill for regulating the Scotch distillers trade, which was at at the same moment passing through the House, allowed *him* wash of about 75 lbs gravity, to produce the same quantity of spirit under a slow process of distillation, and with an unlimited time for fermenting. We feel no hesitation in stating, that the Irish distiller was required by those bills, under heavy penalties, to do that which is physically impossible.

We have the honour to be,
Gentlemen,
your very obedient humble servants,

James Taylor, Examiner G. Books.
Daniel Logie, } Inspectors General
Æneas Coffey, } of Excise.

Chief Commissioners of Excise,
&c. &c. &c.

DISTILLATION, IRELAND.

Copy of the REPORT made to the Commissioners of Excise in *Ireland*, by Officers appointed to superintend the EXPERIMENTS in the Process of Distillation, carried on at *Carrickfergus*, and transmitted by the said Commissioners to the Chancellor of the Exchequer.

Whitehall, Treasury Chambers, 16th May 1821. } S. R. LUSHINGTON.

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